SWAMP
Surface Water Ambient Monitoring Program

The Surface Water Ambient Monitoring Program (SWAMP) was formed in support of Federal Directive AB 982, which mandates that each state develop a comprehensive surface water quality monitoring program. In California, the implementation of such a program is particularly challenging due to diverse geography, disparate monitoring methods, and varied regional data uses. During initial planning, the SWAMP Quality Assurance (QA) Team, in cooperation with stakeholders, carefully prioritized the implementation of quality systems that provide a framework for statewide data comparability.

Achieving Comparability for a Statewide Program Through Careful Selection of Quality Assurance and Quality Control Systems

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Water Boards

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Quality Assurance Management Plan - a document that describes the quality system in terms of the organization's structure, the functional responsibilities of management and staff, the lines of authority, and the interfaces for those planning, implementing, and assessing all activities conducted.

In California, the implementation of a comprehensive surface water monitoring program to support AB 982 is particularly challenging due to diverse geography, multiple land uses, and the state's division into nine Regional Water Quality Control Boards. This, along with critical differences in project design, methods, and data management, have made it difficult to share monitoring information among potential data users.

SWAMP is a performance-based program and does not mandate the use of specific sample collection and analysis methods. Projects within the program may use any method that meets the program's Measurement Quality Objectives. This flexibility has necessitated an emphasis on programmatic comparability. To this end, SWAMP has focused on the use of key quality assurance documents, as well as expert focus groups to ensure that these documents remain complete and current.


Quality Assurance Documents

SWAMP comparability is most efficiently implemented through the use of three scales of quality assurance documents.
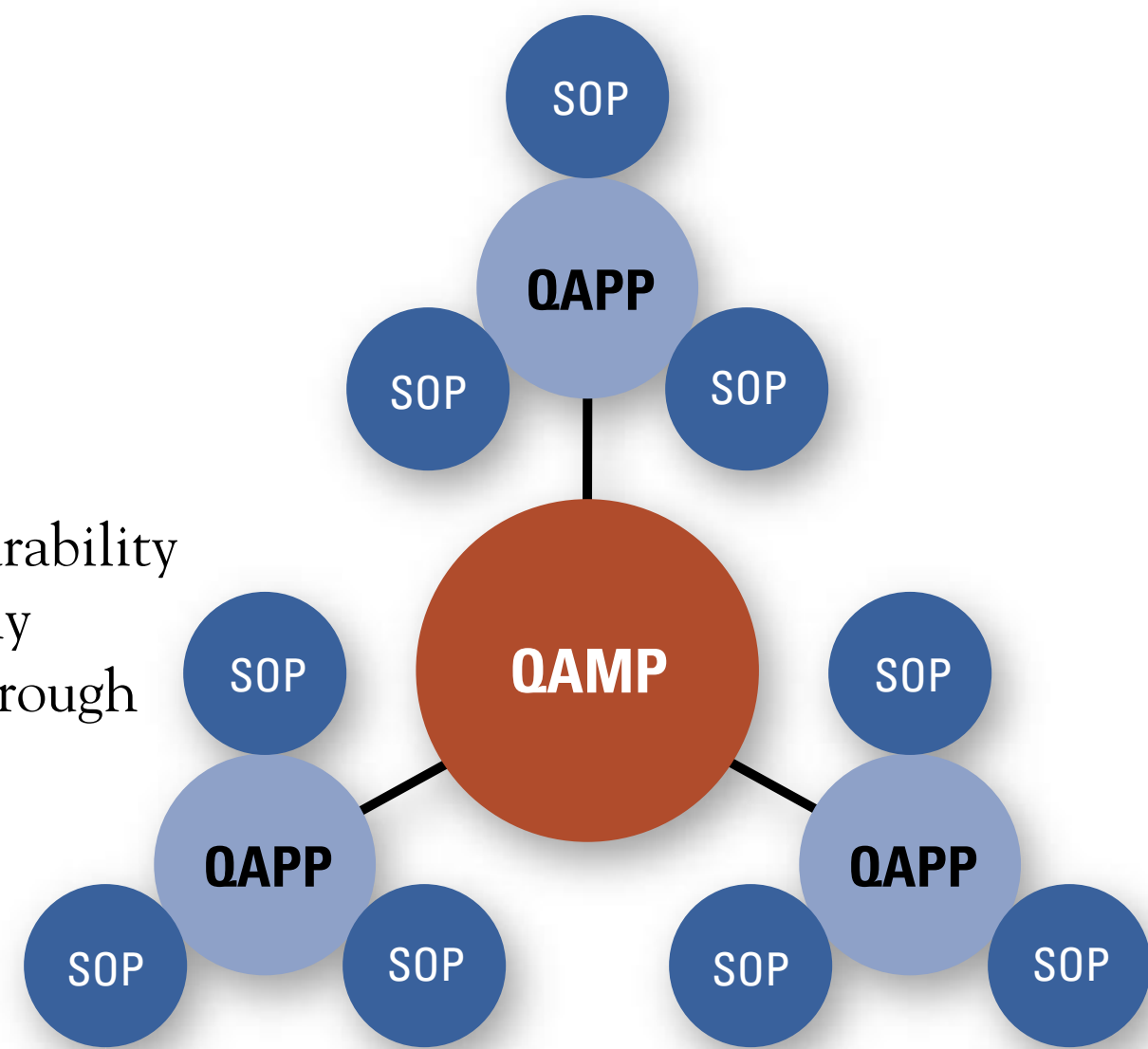
Quality Assurance Management Plan

At the programmatic level, a "quality assurance management plan" (QAMP) serves as an umbrella document for use by each of SWAMP's contributing projects. Of particular importance to comparability is the quality assurance management plan's presentation of "measurement quality objectives" (MQOs) for all program analyte/matrix combinations. Because SWAMP is performance-based, measurement quality objectives specified in the quality assurance management plan must be achieved by program contributors. Data meeting or exceeding these common measurement quality objectives may in turn be used for a common end use.
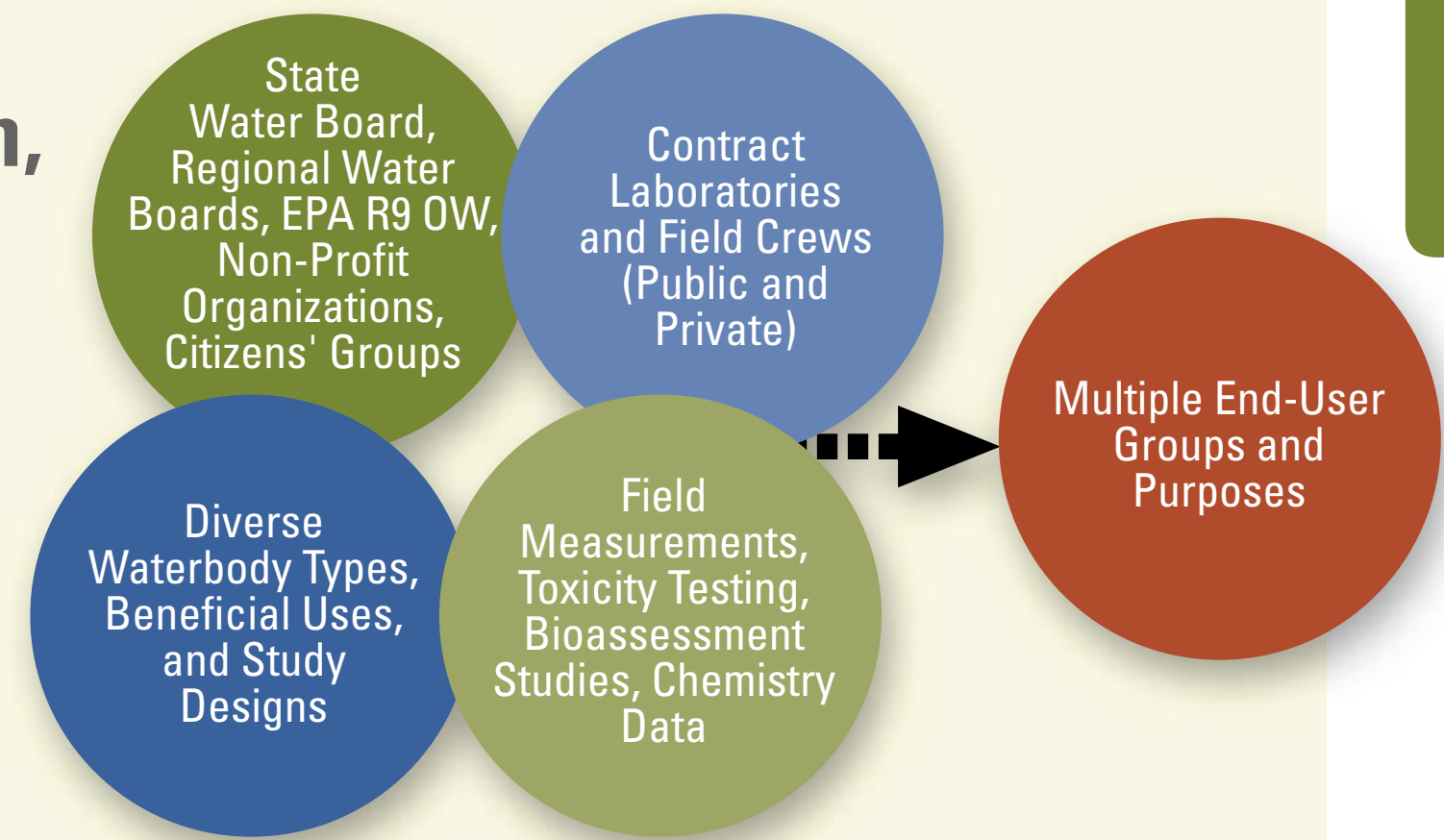
Measurement Quality Objectives - acceptance criteria for the quality attributes measured by project data quality indicators. During project planning, measurement quality objectives are established as quantitative measures of performance against selected data quality indicators such as precision, bias, representativeness, completeness, comparability, and sensitivity.

Quality Assurance Project Plan

All SWAMP data contributors reference the quality assurance management plan in their generation of a project-specific "quality assurance project plan" (QAPP). To further promote comparability, SWAMP encourages the use of free templates and *SWAMP Advisor* software to aid in quality assurance project plan creation.

Prior to sample collection or field measurements, SWAMP evaluates each of the resulting quality assurance project plans against a program-specific checklist and general EPA guidance. The products of this review include the completed checklist, a related narrative, and consultation pertaining to necessary corrective actions. Regardless of their scope, quality assurance project plans completing this standardized review process may then be applied to a common end use.

Quality Assurance Project Plan - a formal document describing in comprehensive detail the necessary quality assurance procedures, quality control activities, and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance or acceptance criteria.

Standard Operating Procedures

Each quality assurance project plan review examines associated "standard operating procedures" (SOPs) that detail the data producer's technical and administrative protocols. Accepted standard operating procedures may then be confidently used in the production of program data.

SWAMP also creates standard operating procedures for use by all data contributors. Use of these standard operating procedures ensures that program data has received consistent review prior to submittal. Quality control check sheets are also furnished to streamline the assessment of individual data points against SWAMP objectives. Their use helps provide the end user with universally flagged data that can be used to assess trends over multiple data batches. To further transparency, standard operating procedures used by SWAMP staff are also publicly available. Currently, these standard operating procedures address lab and field assessments, as well as various components of data management.

Projects using a SWAMP-approved quality assurance project plan and its associated standard operating procedures are ensured of comparability with the quality assurance management plan and, therefore, with the program as a whole. Consequently, SWAMP saves resources that would otherwise be devoted to the oversight of specific activities described within these documents.

Standard Operating Procedure - a document that details the method for an operation, analysis, or action with thoroughly prescribed techniques and steps to be followed. It is officially approved as the method for performing certain routine or repetitive tasks.

Focus Groups

In spite of their importance to comparability, the above quality assurance documents include technical material that is subject to change. While SWAMP prides itself on flexibility, it is imperative that such changes are made responsibly. Among SWAMP's challenges is its simultaneous handling of chemical analyses, toxicity testing, bioassessment studies, and field measurements. Given this scope, SWAMP frequently assembles specialized focus groups to capitalize on the expertise of scientific advisors. Some of these advisors are program participants, while others are leaders from outside commercial, research, or academic communities.

These advisors have been instrumental in the creation of large scale program objectives, as well as their associated measurement quality objectives. Because measurement quality objectives are the basis for SWAMP comparability, it is essential that they reflect the most current data gathering procedures and technologies. Focus groups ensure that necessary updates are made without ignoring inevitable limitations to budget, staffing, or equipment.

Comparability also requires a consensus when modifications to sample handling and analysis are being considered. To date, SWAMP has used focus groups to evaluate proposed changes to sample containers, preservation techniques, and data qualification. Focus group findings are communicated to all program participants, who are then able to update their projects accordingly. This has enabled SWAMP to remain flexible to quick adjustments while maintaining the comparability of data over time.

Conclusion

Comparability has enabled SWAMP to coordinate a wide range of projects and analytical parameters within the State of California. Furthermore, its widely accessible systems have encouraged nationwide interest in the program. This increased participation has already helped leverage SWAMP resources while increasing the total number of data points available to end users.

SWAMP QA Program Coordination with Others

California's Regulated Community
U.S. EPA Region 9 Office of Water
Southern California Coastal Water Research Project
San Francisco Estuary Institute
National Pollutant Discharge Elimination System
U.S. Geological Survey
National Water Quality Monitoring Council
California's Agriculture-Waiver Program
Total Maximum Daily Load Programs
SWRCB Department of Financial Assistance
SWRCB Office of Information Technology
SWRCB Groundwater Ambient Monitoring and Assessment
Non-Point Source Program
CALFED/CA-Bay Delta Authority Science Program
California universities and colleges (research)

The Quality Assurance Research Group at Moss Landing Marine Laboratories

The Quality Assurance (QA) Research Group is based out of Moss Landing Marine Laboratories (MLML) through the support of the San José State University Foundation. The group is independent from other groups at MLML and does not provide direct quality assurance/quality control management for any MLML work.

The QA Research Group consists of five full-time staff members working at various levels on several projects. They are experienced in quality management and represent a variety of technical backgrounds, including chemical testing (organics/inorganics), toxicity testing, statistics, wadeable stream assessment, and database development. The group is currently focused on two large-scale programs: the State of California's Surface Water Ambient Monitoring Program and the CALFED/California Bay-Delta Authority Mercury Speciation Monitoring and Research Studies. The group is also involved in a variety of smaller projects, including research in areas such as sample holding times and preservation techniques.